Invertebrate conservation status and the limits of reliable information: examples from Victoria, Australia

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Abstract

A recent 'desk-top survey' of information available on several non-aquatic invertebrate groups (molluscs, butterflies and moths, ants, bees and jewel beetles) including taxa of conservation interest in Victoria is summarised. The paucity of information on many taxa renders sound assessment of conservation status based on abundance, distribution, ecological knowledge and vulnerability very subjective, and, in many cases, largely dependent on the opinion of individual workers. In a few cases, precise identification of taxa cannot be confirmed. The limitations of existing information are discussed, together with ways to improve the framework knowledge of invertebrates to enhance their incorporation into wider conservation agendas within the State.
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Introduction

The widely-used conservation status category of 'Data Deficient' (IUCN) is difficult to apply consistently and, as Clarke and Spier-Ashcroft (2003) demonstrated for a variety of Australian invertebrates, the decision to designate a species as 'Critically Endangered' or 'Data Deficient' may be very finely balanced. This note is prompted by problems and concerns encountered when we were charged recently with evaluating existing information on a number of non-aquatic invertebrates of conservation interest in Victoria, as a prelude to planning surveys to guide management for their conservation. The impetus for this initial 'desk study' was the need to assess impacts of fuel reduction burning in many parts of the state, with the implication that the process could constitute a severe threat to invertebrates of conservation interest unless managed carefully. Calls for much more extensive 'control burning' for asset protection followed the 2009 bushfires (New *et al.* 2010). The state's Department of Sustainability and Environment (DSE) seeks to undertake these as responsibly as possible in harmony with wider conservation needs.

Our remit was to assemble and collate all available information on selected invertebrate taxa which had been signalled as of conservation interest in Victoria through being listed (1) under the state's *Flora and Fauna Guarantee Act* 1988 (FFG) or (2) on a statewide 'Advisory List of Threatened Invertebrates' maintained by DSE and used to guide management, but with many of the species not protected formally. Most species on these lists are scarce and highly localised, some are presumed to be narrow range endemics, and some are noted simply because they are poorly known. Historically, some are known to have declined in range within Victoria (or are purported to have done so), but others have not been seen for many years and may even be extinct. They are intrinsically difficult to evaluate and study, and allocation simply to 'Data Deficient' is a convenient and probably accurate step, with any further information likely to be serendipitous rather than the outcome of detailed planning; however, refinement to a more hierarchical level of threat is required to indicate relative priority of need. The species recorded on either schedule are simply representative of the wider need, and the lists are indicative rather than definitive. Many orders of arthropods, for example, have no representation. Thus it is important that the taxa reported are seen to have been appraised responsibly in order to maintain credibility in furthering conservation.

The exercise reported here illustrates some of the problems in determining conservation status of poorly known invertebrates, and how to advance that knowledge constructively. The problems reflect much wider scenarios of dealing with individual species in rich but inadequately documented faunas.

Methods

The taxa selected, each a natural group with all Victoria-listed species included, comprise a total of 53 species or subspecies, encompassing taxa with differing ways of life and inhabiting a range of major biotopes. They are summarised in Table 1. All are considered 'rare' or, at least, highly elusive. A dossier prepared for each species included data gathered from all available sources, namely all obtainable published information on incidence and biology, consultation with relevant specialists and collectors, who generously supplied label data from their own specimens or records, and label data and database information from Museum Victoria. 'Status' is given as inferred in expert opinion or listings, but allocation often reflects individual opinion against different criteria, and is inconsistent across different groups.

Results

The major outcomes for each individual species (Appendix) emphasise the fragmentary nature of information available, and that the chances of augmenting this easily may be small. For some taxa, imprecise historical records constitute the only information available. Many of the focal taxa are known from single or few localities, and may not have been reported or collected for many years. Some have been sought diligently in targeted surveys, with minimal rewards, and the incidence of adults (such as hill-topping butterflies or flower-visiting jewel beetles) does not always enable association with a breeding site or larval resources. Much of the information is necessarily inferred. It is important to acknowledge that 'collection-mining' for individual records did not extend to other major museum collections; much of that information is encompassed in published accounts.

Two of the hymenopterans exemplify some of the problems. The ant *Peronomyrmex bartoni* Shattuck & Hinkley is known from two worker individuals (now the holotype and paratype) from separate localities in Victoria, and no additional specimens of this very distinctive species have been found from numerous surveys for ants since 1995. The ant is undoubtedly rare, but nothing is known of its biology. The Golden carpenter bee, *Xylocopa aeratus* (Smith), has not been reported in Victoria for many years, with the main records from the Grampians no later than 1884; however, it is not uncommon in parts of coastal South Australia (Kangaroo Island), New South Wales and Queensland, so that a strong biological framework exists. It may, indeed, be vulnerable to burning, because it nests in dry stems of *Xanthorrhoea*. It is now likely to be extinct in Victoria, and was listed nationally as Data Deficient by Clarke and Spier-Ashcroft (2003).

A restricted range is most evident for the four species of snails (Mollusca), as none has been

Table 1. Focal non-aquatic invertebrate taxa used to aid determination of conservation status in Victoria

Taxon	Number of species	Rationale
Mollusca: Charopidae	3	All very restricted distribution
Rhytidae	1	The four species overlap in single region: wet forests of Otway Ranges
Hymenoptera: Formicidae	2	Both poorly known
Apidae	1	Possibly extinct in Victoria
Coleoptera: Buprestidae	13	Many flagged as of conservation concern, some apparently very rare
Lepidoptera: Castniidae	6	Notable flagship group; several very scarce and localised
Noctuidae	1	Very few records in Victoria
Zygaenidae	2	Few specimens with clear data
Hesperiidae	7	
Lycaenidae	14	
Nymphalidae	3	Butterflies are best-documented group, with high concern over declines

found outside a small area of the Otway Ranges, and all are confined to wet forest habitats. They appear to be true local endemics. Some of the moths and butterflies (Lepidoptera) manifest similar concentrations — some sun moths (Castniidae), for example, appear to be restricted to the inland north west of Victoria. Other Lepidoptera, however, display distributions that appear to represent fragmentation of habitats, because they are recorded from widely-separated parts of Victoria. The Eltham copper butterfly *Paralucia pyrodiscus lucida* Crosby is one of the better-documented cases, but similar situations can be postulated for other lycaenids such as ant blue butterflies *Acrodipsas* species. For many, the low numbers of records thwart firm conclusions. For a few, concentration on particular localities by collectors has led to accumulation of numerous individual specimen records over several decades, but has not extended known distributions.

Discussion

Basic requirements, on which to base estimates of conservation status and needs, involve information on habitat (resource) parameters, distribution and population dynamics. The last is the most difficult to assess meaningfully for most invertebrates. Knowledge of population dynamics and population sizes for most species assessed here is fragmentary to non-existent, and so not available to aid conservation status assessment. Implications that most of the populations involved are small, highly localised and perhaps vulnerable seem reasonable, but cannot be supported by quantitative information. Likewise, critical resource needs of many rare invertebrates can often only be suggested by coincidence with living individuals — with information on food plants or specific hosts or prey often very incomplete. For some of the species treated here, a relatively sound framework is indeed available – for example through accumulated collector interest in the butterflies — but this is not general. The major component of determining conservation status is distribution, and changes in area of occupancy, as far as these can be assessed. Specimen records and label data are the primary source of historical information.

The approach of using museum specimen records to evaluate distributions and infer conservation status by indicating historical changes depends on the reliability of the information present on data labels. Positively, many of the rarer species of collectable taxa (equating largely to those of conservation interest) may be represented strongly in museum collections, simply because these are actively sought by collectors. Such accumulations cannot, however, reflect the collecting or survey effort invested in the specimens present. However, only a small proportion of older specimens bear reliable information, with most of the labels comprising no more than a place or other locality name, and date of capture. Habitat data are relatively rare, and this lack is problematical because it is usually impossible to infer any habitat data from the name of a town or region. An accurately labeled specimen, of course, confirms incidence at the time and place of capture, but label information conventionally given has changed markedly during the last century or so, and ecological inference and precise locality (with grid reference, latitude/longitude coordinates or GPS reading) is now the norm. Archival specimens, including most of those captured before the middle of the last century, usually lack this precision, and, indeed, some hobbyists in the past deliberately gave misleading detail on labels of rare species to safeguard 'their' localities from other collectors (discussion by Dunn 2008, 2009) or even possibly to disguise their lack of permits to collect within protected areas. Such biases rarely can be eliminated completely, and without specific knowledge the information present has to be taken as accurate. Most collectors, of course, have the highest levels of integrity, but many conventional labels of the time are abbreviated. The largest single collection of Lepidoptera in Museum Victoria (that of about 45 000 specimens, made by George Lyell) includes many simply labeled 'Gisborne', as his home town, but may refer to anywhere within a substantial radius of this base and encompassing a wide range of vegetation and other habitat conditions. The labels illustrated as examples by Moulds (1999) are by no means the exception.

Disturbingly little information was found on most of the taxa we considered. For some this is enhanced by information from records from outside Victoria, but many local endemics, with a high conservation priority, remain poorly known. The lack of distributional information contrasts with that available for some groups of freshwater insects in Victoria, reflecting their adoption as indices to measure and monitor water quality, based on incidence and relative representation of the larval stages. Apart from butterflies (New 2010) and to a lesser extent some castniid moths (Douglas 2008), a sound factual basis for planning conservation management seems to be far off. Even Lepidoptera, benefiting from the long-established interest by hobbyists as the major source of records and distributional and biological information, still contain notable gaps. For some, targeted surveys have failed to reveal further specimens to enhance distributional knowledge based on a handful of scattered records — but other surveys have confirmed losses from sites now alienated by processes such as vegetation clearing for urban development or agricultural conversion, so that recent records are presumed to constitute remnants of a formerly more extensive distribution. For example, the Giant Gippsland Earthworm, *Megascolides australis* (McCoy), for which site characterisation may furnish clues for critical resources or favoured biotopes to hone the effectiveness of additional surveys. However, separating historical range contraction and increased fragmentation within a more constant range boundary is difficult. For some of the species noted here, the overall distribution range may never have been more extensive than that encompassed by linking the outlying extant populations to define an area of occurrence, within which occupancy is progressively reduced and fragmented. Perhaps only for some of the Lepidoptera amongst our present array is there reasonable evidence of losses from parts of the historical range, so that remaining isolated populations are indeed fragments. The species involved are all ecological specialists, and susceptible to condition and availability of particular larval host plants and, for some, additional resources such as mutualistic ants. Targeted surveys for the Eltham copper butterfly as one of the most intensively studied listed butterflies in Victoria) have yielded several previously unknown populations in central Victoria, and the additional information enabled definition of priority areas for forthcoming exploration. Nevertheless, both its sole larval food plant (Sweet Bursaria *Bursaria spinosa* Cav.) and host ant genus (*Notoncus*) are far more widespread than the butterfly, and factors governing its incidence remain unknown. It helps to emphasise the twin questions that must be approached when considering distributions of such invertebrates, namely 'what is the distribution?' and 'why?', as well as inferring reasons for any apparent or real change. For the Otway snails, we simply do not know whether these are long-term narrow range endemics, or whether they have been lost from other areas to leave them as remnants in their present restricted range.

Even with accurate locality data, the 'nearest minute' of latitude/longitude still encompasses a substantial area, often variable in character and difficult to explore fully through systematic surveys. Thus the 'Bioinfomatics database' of Museum Victoria, an invaluable accumulation of information from specimen and other records, provides summaries of historical and recent distribution of the state's butterflies, but can be plotted on only relatively large mapping units. Dunn's recent (2008) commentary on the wider 'Dunn & Dunn database' for butterflies, further indicates the problems that arise. For some species, locality records may not even indicate breeding sites nearby — most records of *Acrodipsas*, for example, are of hill-topping adults, and it is unknown over what distance they may have flown before they were detected and recorded; several kilometres or more may be involved. In the case of *A. brisbanensis* (Miskin), even the identity of the supposedly obligatory host ant has not been confirmed and colonies of the most likely genus (*Papyrius*) are difficult to detect. 'Spot' captures or records of (perhaps transient) adult butterflies cannot augment this background.

In short, most of the butterflies included in the lists are difficult to survey systematically, and most records have arisen from serendipitous captures, rather than planned surveys. Extensive surveys within apparently suitable habitats, and undertaken by experienced lepidopterists, commonly have failed to reveal the taxa. For all taxa considered here, species recognition can be problematical. Despite recent concerns over 'butterfly collecting' in Australia (Sands and New 2002), there is considerable need for additional surveys of butterflies and all other invertebrates on our lists. A major problem is lack of capability, with many of these animals difficult to identify and few experts able to do so — many, indeed, are 'orphaned' in that no specialists are present within the state, or even within Australia. Current lack of funding and other support (such as training of taxonomists) for such basic documentation of Australian biodiversity reflects more global concerns that this unsatisfactory state will persist. Most of the taxa involved cannot be recognised unambiguously without close examination, and the paucity of relevant experts for each group necessitates most surveys being undertaken by workers who are not able to identify the target groups to species level with some degree of confidence. Risks of misidentifications from sightings alone are substantial. Misidentifications may enter the formal record, and the resulting bias cannot be checked without voucher reference specimens, but 'prohibition of take' of listed species is a highly controversial theme in invertebrate conservation in Australia, and can markedly inhibit accumulation of records and basic biological knowledge (Sands & New 2002).

One of the jewel beetles noted here exemplifies the problem of direct misidentification (the presence of *Castiarina mima* (Saunders) in Victoria is based on a misidentification; Douglas pers. comm., 2011). Another, *Themognatha duboulayi* (Saunders), is recorded in Victoria from a single individual (Museum Victoria) that may have been mislabeled. Otherwise it is known only from Queensland and the Northern Territory and its presence in Victoria remains to be confirmed. An allied problem is the uncertain status of many butterfly populations as full species or putative subspecies. Clarification can come only from detailed appraisal of specimen morphology, genetics and population biology. Rather than prohibiting capture, a case could be made validly for capture and responsible deposition of specimens detected at any localities beyond the recorded distributional occupancy, with emphasis on providing accurate locality and other data, and permits made available to any bona fide survey operative. In parallel, the small numbers of specimens from many currently-documented localities do not always allow for easy taxonomic allocation, and further reference material for some of these would be valuable. Whilst not in any way condoning exploitative or harmful collecting, there is opportunity to clarify the taxonomic status of some species by using modern molecular techniques for extracting DNA from small samples of wings or by removing a leg from living insects and releasing them without apparent lasting harm.

The species treated here are, as noted above, by no means representative of the full variety of invertebrates that merit parallel considerations, but in the main are those that have simply acquired notoriety in some way, or have elicited concerns over recent losses or declines that happen to have been noticed. The above argument in favour of voucher specimens thus extends much more widely – a number of additional deserving candidate beetles (Coleoptera) and butterflies and moths (Lepidoptera) were suggested to us during this project. As 'lists' are enlarged and revised, many additional invertebrates will come to conservation notice. Calls for major investment in invertebrate surveys and specimen accumulation, with curation facility assured, are by no means new. The values of major 'ecological collections' were discussed, *inter alia* by Danks *et al.* (1987) and Yen (1993), and those suggestions appear increasingly urgent. This exercise has again emphasised their vital importance. Amongst other uses, they constitute an invaluable archive barometer for monitoring future changes, including any induced by climate change, whereby species-level conservation efforts will need to encompass considerations of suitable sites well beyond the current reported distributional ranges.

The paucity of biological information renders recommendations for focused conservation difficult, even if these are needed, which in itself is often difficult to determine. This situation is recognised widely, not least through the formal ability to delist species from FFG schedules should they be found to be unthreatened. However, without that basic ecological background, assessing vulnerability is largely a hypothetical exercise. Thus, in the present context the importance of refuges from fire, in time and space, is a critical component of management by planned burning (New *et al.* 2010), but other than for some of the relatively well-documented Lepidoptera is largely unknown. One might suggest, for example, that the Otway snails may be relatively secure, simply because wet forest is unlikely to be burned deliberately, but conditions could change rapidly, and associated clearing or construction of fire breaks against wild fire might have serious impacts. The factors that regulate the snails' distributions at present are not known.

We were dismayed by how little information was easily recoverable on many of the species we attempted to appraise. Despite our initial fears that this might indeed be so, we had hoped for more encouraging scenarios to emerge. The outcome is that the ability to focus future surveys on sound ecological information for many species is very limited, and is endorsed by recognition that extensive searches within any documented range may be highly unpredictable. Most published records of specimens, even with accurate grid references, enable re-searching of areas only of up to several km^2, is still a formidable exercise to undertake and encompass considerable variety of resources and topography. The main practical dilemma is that additional biological information is needed to reliably inform conservation management, and can be augmented only through additional surveys, over large areas and with small chances of recovering the target taxa, and with the necessary support and finance unlikely to be available. Repeated searches are needed to assess unknown seasonal occurrence and to monitor trends in the abundance and distribution of sensitive species that are sufficiently abundant to provide meaningful information.

With those considerations in mind, we suggest focus on the best-understood groups, namely butterflies, sun moths, the Otway snails and, perhaps, jewel beetles. However, species overlapping in distribution, habitat or accessibility to a common sampling approach may provide opportunity for a more efficient approach to surveys, as a serious need. Thus, approaches such as hill top surveys for butterflies (see Britton and Ginn 2008 for an analogous New South Wales study) have the potential to record many of the species of interest, although without amplifying ecological information, to help define broad distribution patterns. Focus on areas or sites for which listed species overlap may also be worthwhile, for example, the Grampians NP has historical records for several elusive butterflies and beetles as well as Golden carpenter bee *Xylocopa aeratus*. The need for systematic surveys of invertebrates in major protected areas has been advanced previously by Sands and New (2003).

A third approach is simply to extend surveys for a few relatively well-documented taxa to cover as much of their likely range as possible, to augment ecological knowledge and provide a firm template for their management. Searches of this nature can be rewarding; for example, several additional populations of Eltham copper butterfly have been discovered by targeted search, (e.g. Canzano and Whitfield 2008). An earlier survey for *Myrmecia* sp. 17, originally known from four sites, led to the discovery of more than 50 additional localities (Wainer 1996) and a considerably greater understanding of the ant's requirements. Such knowledge gained from practical experience helps greatly in increasing reliability and values of future surveys.

In parallel, recent discoveries of the Golden sun moth *Synemon plana* in many grassland sites in central Victoria have resulted from two main impetus of concerns. Firstly, the fates of many native grassland remnants under pressure for urban and industrial development has lead to increased survey intensity, and secondly, the effectiveness of survey has improved markedly because of greater understanding of the moth's behaviour, thus reducing the risks of 'spurious absences' being recorded (New 2011). This is not the case for most of the other species treated here, for which serendipity will continue to play the major role in survey outcomes. One need is simply to communicate that such poorly-known taxa exist, and that ecologists undertaking invertebrate surveys in any related habitat or within their recorded distribution be enabled to recognise them and allowed to capture specimens for expert examination to confirm identity and central capture of the data.

As Hudgins *et al.* (2011) have emphasised, two kinds of 'detectability' are needed in insect conservation and to help evaluate needs through monitoring. They are often not distinguished as clearly as for the Golden sun moth. These are (1) presence on a site, investigated by a disciplined sampling regime likely to detect the target species, and (2) the more complex need to assess numbers (population size) as a basis for monitoring trends and possible threat impacts. The numerous factors affecting probability of detection, whether presence of a species or number of individuals, vary according to the differences in observer skills and experience, and to the wide range of environmental conditions. These include critical consumable resources (specific food plants, prey or hosts), a wide range of utilities that enable those resources to be exploited, and parameters (such as weather and time of day) that limit or govern activity. Collectively, these influence spatial and temporal detectability of many invertebrates in different ways. Detecting 'rare' or 'elusive' species also necessitates, if possible, distinguishing between these states. Whereas 'rare' species may genuinely reflect low abundance and restricted geographical range, an 'elusive' species may not be rare, even when regarded as such, but simply difficult to detect or plan to find. In the past, *Synemon plana* fell into this category, with its 'Critically endangered' status reflecting lack of the ecological knowledge that enabled detection. Increasing and informing detection is a key need for gaining greater insight into most of the taxa discussed here.

The desk survey reported here has confirmed the massive lacunae in ecological information and distributional knowledge of many of the invertebrates that are of greatest formal conservation prominence in Victoria. At present, the notice given to many of these is truly 'data deficient'; should that status be allowed to persist indefinitely, the credibility of the listing process (formal or otherwise) becomes open to question as simply precautionary rather than reflecting reality. Several of the species, reported only from isolated records in northern or far eastern Victoria, are probable vagrants from a more northerly distribution where they are well-established. Such 'political outliers', intriguing for inventory, are not a priority for further conservation focus, although their possible establishment and range expansions that reflect climate change is of considerable interest. All the species considered have been noted because of concerns over their rarity or decline, with the paucity of records rendering their precise status and needs enigmatic. Many are likely to remain so, because the intensive searches (or simple luck!) needed to augment information, cannot be guided meaningfully by biological knowledge. In contrast, for a few other species, the information summarised here, where some of it flows from previous detailed investigations, furnishes a template based on an ecological overlay of defined critical resources and from which future surveys can be focused much more precisely.

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Appendix. Status of non-aquatic invertebrates in Victoria appraised, and major outcomes from desk-top survey

Taxon	Status, specimen records, comments
Mollusca	
Allocharopa erskinensis (Gabriel)	Vulnerable. All specimen records from same locality.
Geminoropa scindocataracta (Gabriel)	Vulnerable. Single locality.
Pernagera gatliffi (Gabriel)	Endangered. Very small range.
Victaphanta compacta (Cox & Hedley)	Endangered. Records all from same general locality
Hymenoptera	
Peronomyrmex bartoni Shattuck & Hinkley	Critically endangered. Two specimens from separate localities in central Victoria
Myrmecia sp. 17	Vulnerable. Records from about 60 sites; widely distributed
Xylocopa aerates (Smith)	Regionally extinct. ca 20 documented specimens, some with only vague data. Not seen in Victoria for >60 years
Coleoptera	
Temognatha flavocincta (Gory & Laporte)	Vulnerable. Few records, most from western Victoria; one from Melbourne area probable introduction in wood.
T. maculiventris (Macleay)	Vulnerable. Two localities, both western Victoria.
T. sanguinipennis (Gory & Laporte)	Vulnerable. Two records from widely separated localities.
T. tricolorata (Waterhouse)	Vulnerable. One record, north west Victoria.
T. congener (Saunders)	Data deficient. One record, north west Victoria.
T. duboulayi (Saunders)	Data deficient. (One record: likely mislabelling: ? not in Victoria)
T. fortnumi (Hope)	Data deficient. One record.
T. pascoei (Saunders)	Data deficient. Two records, separate localities.
Castiarina cyanipes (Saunders)	Data deficient. Eight records, western Victoria: range quite extensive.
C. insularis (Blackburn)	Data deficient. Three records, widely separated localities.
C. jekellii (Saunders)	Data deficient. Three records, north west Victoria.
C. militaris (Carter)	Data deficient. Three records, widely separated localities; one near Melbourne an introduction?
C. mima (Saunders)	Data deficient (one record believed misidentification; not in Victoria)
Lepidoptera	
Synemon discalis Strand	Critically endangered. Records from two localities in north west of Victoria.
S. nais Klug	Critically endangered. Few records, from three nearby sites.
S. jcaria R.Felder	Critically endangered. 8 records, several localities in north and west Victoria.
S. plana Walker	Critically endangered. Many records, increased markedly in last few years; important flagship species for native grasslands.
S. selene Klug	About 16 localities reported, but long believed extinct in Victoria before rediscovery in 1991; polymorphic and parthenogenetic.
S. theresa Doubleday	Regionally extinct. Few records; not seen in Victoria for about 100 years
Hecatesia exultans Walker	Near threatened. Few records, western Victoria.
'*Hestiochora*' *rufiventris* (Walker)	Data deficient. Few records, western Victoria.
H. tricolor (Walker)	Data deficient. Few records, southern Victoria.
Antipodia atralba (Tepper)	Endangered. Records from 4 locations in north west Victoria.
Antipodia chaostola chares (Waterhouse)	Data deficient. ca 50 records, widely distributed from central to western Victoria, many records from Grampians area.
Trapezites luteus luteus (Tepper)	Endangered. Few small isolated populations in central Victoria. Severely threatened by habitat loss.
Hesperilla flavescens flavescens Waterhouse	Vulnerable. Records from small coastal/subcoastal sedgelands south and west of Melbourne: substantial conservation interest.

Appendix (continued)

Taxon	**Status, specimen records, comments**
H. mastersi mastersi Waterhouse	Data deficient. Records from far south east Victoria.
Pasma tasmanica (Miskin)	Vulnerable. Widespread but localised in western and south western Victoria.
Telicota eurychlora Lower	Vulnerable. One record, far south east Victoria.
Acrodipsas aurata Sands	Data deficient. Single Victorian record near New South Wales border, north west of Corryong.
A. brisbanensis cyrilus (Anderson & Spry)	Endangered. Scattered widely over central and western Victoria; biology poorly known.
A. myrmecophila (Waterhouse & Lyell)	Critically endangered. Records are mostly historical; currently known from only two sites in Victoria.
Candalides absimilis ssp	Data deficient. Scattered populations mainly in eastern Victoria.
C. noelkeri Braby & Douglas	Critically endangered. Few records, few small populations in inland north west Victoria
Hypochrysops ignitus ignitus (Leach)	Vulnerable. Widespread but populations localised and small; some populations known to have become extinct.
Jalmenus icilius Hewitson	Vulnerable. Formerly widespread in central and western Victoria; now scarce with several populations known to have become extinct.
Ogyris genoveva araxes (Waterhouse & Lyell)	Vulnerable. Widespread from central to western Victoria. Scarce, locally extinct near Melbourne.
O. halmaturia (Tepper)	Regionally extinct. Mainly western Victoria; no confirmed Victorian records since 1945.
O. subterrestris subterrestris Field	Vulnerable. North west Victoria. Formerly at Mildura but now probably extinct there; last specimens collected in 1972.
O. otanes C. & R. Felder	Critically endangered. Few records from Big Desert, western Victoria. Most reports from 1970s; may be locally extinct.
Paralucia pyrodiscus lucida Crosby	Endangered. Records from few disjunct localities in central and western Victoria. Important flagship species for urban conservation.
Theclinesthes albocincta (Waterhouse)	Endangered. Localised populations in north western Victoria.
Pseudalmenus chlorinda fisheri (Blanchard)	Vulnerable. Likely endemic to Grampians region; taxonomy unsettled.
Oreixenica latialis theddora Couchman	Endangered. Narrow range endemic on Mt Buffalo plateau; entire range within national park
Heteronympha cordace wilsoni Burns	Regionally extinct/Critically endangered. Few records, confined to far south west of Victoria, but possibly similar form in Grampians. Unpublished reports of recent incidence in far south west Victoria.
Hypocysta adiante (Hubner)	Regionally extinct. Single specimen recorded from eastern Victoria in 1933: ? possible vagrant

Common brown.
Photo by Michael F Braby